

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE  
 in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 03 November 2000 (03.11.00)	<b>Applicant's or agent's file reference</b> 4239-54280
<b>International application No.</b> PCT/US00/06244	<b>Priority date (day/month/year)</b> 10 March 1999 (10.03.99)
<b>International filing date (day/month/year)</b> 10 March 2000 (10.03.00)	
<b>Applicant</b> GE, Hui	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
 29 September 2000 (29.09.00)

☐ in a notice effecting later election filed with the International Bureau on:  
 \_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<b>The International Bureau of WIPO</b> 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer S. Mafla Telephone No.: (41-22) 338.83.38
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(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
14 September 2000 (14.09.2000)

PCT

(10) International Publication Number  
**WO 00/54046 A3**

(51) International Patent Classification<sup>7</sup>: G01N 33/543, 33/68

(21) International Application Number: PCT/US00/06244

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(26) Publication Language: English

(30) Priority Data:  
60/123,586 10 March 1999 (10.03.1999) US

(71) Applicant (for all designated States except US): THE GOVERNMENT OF THE UNITED STATES OF AMERICA, as represented by THE SECRETARY, DEPARTMENT OF HEALTH AND HUMAN SERVICES, THE NATIONAL INSTITUTES OF HEALTH [US/US]; Office of Technology Transfer, Suite #325, 6011 Executive Boulevard, Rockville, MD 20852 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): GE, Hui [CN/US]; 437 Upshire Circle, Gaithersburg, MD 20878 (US).

(74) Agent: NOONAN, William, D.; Klarquist, Sparkman, Campbell, Leigh & Winston, LLP, Suite 1600, One World Trade Center, 121 SW Salmon Street, Portland, OR 97204 (US).

(81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— With international search report.

(88) Date of publication of the international search report:  
21 December 2000

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: UNIVERSAL PROTEIN ARRAY SYSTEM

(57) Abstract: This invention relates to ordered arrays of molecules, for instance polypeptides or proteins. Such arrays, referred to as universal protein arrays, are described in both macro- and microarray formats. Methods of production and use of such arrays are also described. Also disclosed are kits for the use of such arrays and the preparation of probes for use with them.

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**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
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EE	Estonia	LR	Liberia	SG	Singapore		

# INTERNATIONAL SEARCH REPORT

Inte application No

PCT/US00/06244

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 G01N33/543 G01N33/68

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, EPO-Internal, CHEM ABS Data, BIOSIS, MEDLINE

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	MEDLINE, Washington DC USA; abstract no. 20075324, abstract XP002144063 & H. GE : "UPA, a universal protein array system for quantitative detection of protein-protein, protein-DNA, protein-RNA and protein-ligand interactions." NUCLEIC ACID RESEARCH, vol. 28, no. 2, 15 January 2000 (2000-01-15), page e3 Bethesda MD USA  -/--	1-42

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*G\* document member of the same patent family

Date of the actual completion of the international search

4 August 2000

Date of mailing of the international search report

01/09/2000

Name and mailing address of the ISA

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NL - 2280 HV Rijswijk  
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Authorized officer

Van Bohemen, C

# INTERNATIONAL SEARCH REPORT

Inte log Application No

PCT/US 00/06244

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 063 810 A (CIBA-GEIGY AG) 3 November 1982 (1982-11-03)  figure 1; examples 1-14	1-21, 24-30, 33-42
Y	—	1-42
X	EP 0 818 467 A (NEC CORPORATION) 14 January 1998 (1998-01-14)  claims 1-38	1-21, 24-30, 33-42
Y	—	1-42
X	MEDLINE, Washington DC USA; abstract no. 97348061, abstract XP002144064 & E. ADACHI ET AL.: "Assembly process of 2D protein arrays in wetting films." ADVANCES IN BIOPHYSICS, vol. 34, 1997, pages 81-92, Japan	13, 24

# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No.

PCT/US90/06244

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 63810	A	03-11-1982	AR 231590 A	28-12-1984
			AT 18463 T	15-03-1986
			AU 560790 B	16-04-1987
			AU 8306982 A	04-11-1982
			BR 8202492 A	12-04-1983
			CA 1200761 A	18-02-1986
			CY 1437 A	10-03-1989
			DE 3269567 D	10-04-1986
			DK 189182 A,B,	30-10-1982
			ES 511735 D	16-10-1983
			ES 8400199 A	01-01-1984
			ES 523722 D	16-05-1984
			ES 8405156 A	01-09-1984
			ES 523723 D	16-05-1984
			ES 8405157 A	01-09-1984
			FI 821441 A,B,	30-10-1982
			GB 2099578 A,B	08-12-1982
			GR 75430 A	17-07-1984
			HK 53888 A	22-07-1988
			IE 53295 B	12-10-1988
			IL 65627 A	29-11-1985
			JP 58009070 A	19-01-1983
			MX 160043 A	09-11-1989
			NO 821411 A,B,	01-11-1982
			NZ 200443 A	12-07-1985
			PH 26773 A	28-09-1992
			PT 74816 A,B	01-05-1982
			SG 25288 G	15-07-1988
			US 5486452 A	23-01-1996
			ZA 8202896 A	29-12-1982
EP 818467	A	14-01-1998	JP 10025299 A	27-01-1998

# PATENT COOPERATION TREATY

# PCT

REC'D 27 JUN 2001

WIPO PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>4239-54280</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/US00/06244</b>	International filing date (day/month/year) <b>10/03/2000</b>	Priority date (day/month/year) <b>10/03/1999</b>
International Patent Classification (IPC) or national classification and IPC <b>G01N33/48</b>		
Applicant <b>THE GOVERNMENT OF THE UNITED STATES OF AMERICA...</b>		



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
  - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

**3**

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  <b>29/09/2000</b>	Date of completion of this report  <b>25.06.2001</b>
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  <b>Van Bohemen, C</b>  Telephone No. +31 70 340 2199  

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US00/06244

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):  
**Description, pages:**

1-32 as originally filed

### Claims, No.:

1-45 as received on 17/02/2001 with letter of 16/02/2001

### Drawings, sheets:

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US00/06244

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Yes: Claims 1-45
	No: Claims
Inventive step (IS)	Yes: Claims
	No: Claims 1-45
Industrial applicability (IA)	Yes: Claims 1-45
	No: Claims

2. Citations and explanations  
**see separate sheet**

## VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

**see separate sheet**

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

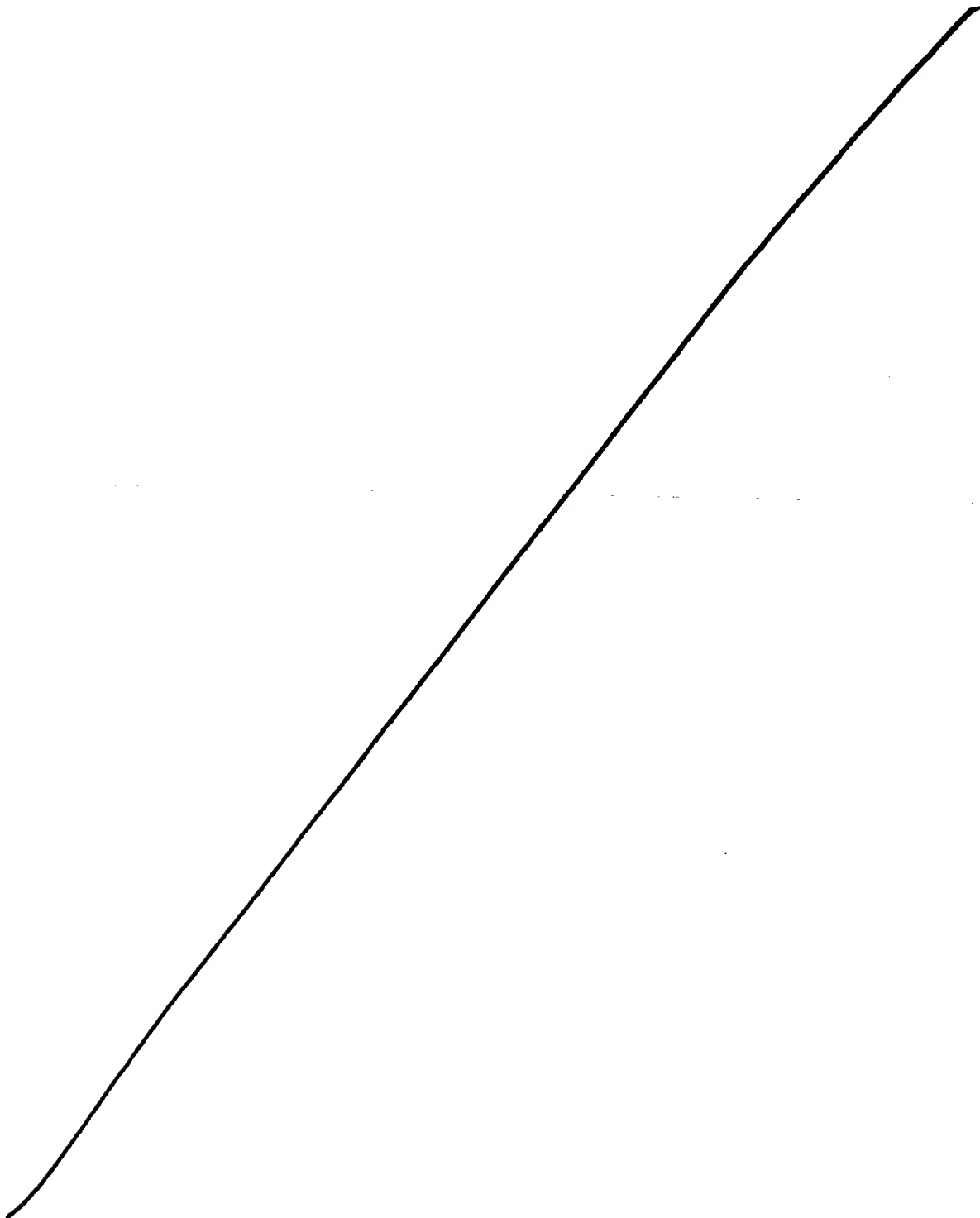
## VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/US00/06244

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**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/US00/06244

**Reasoned statement**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following document, which has been cited as an "X - document" in the international search report:

D1: EP-A- 818467 (NEC CORPORATION )

The present application (PA) does not meet the requirements of Article 33(1) and (3) and Rule 64 PCT, because the subject-matter of claims 1-45 does not appear to be inventive.

Document D1 is identified as the closest prior art (CPA). By his own admission (cf. Statement under Article 34 PCT) the applicant confirms that D1 discloses aligned peptide arrays with a plurality of peptide segments and methods using said arrays. Claims 1-45 of the PA differ from this by using full length polypeptide molecules rather than polypeptide segments.

In consequence, the objective problem identified by the PA is identified as follows: the provision of further peptide arrays and methods using said arrays.

The solution is identified as follows: use full length polypeptide molecules.

Departing from the CPA document D1, it would appear that the artisan would find himself in a one-way street situation: the artisan would be unavoidably propelled to use full length polypeptide molecules on arrays in addition to polypeptide segments. There would be a reasonable expectation of success. Hence, the use full length polypeptide molecules on arrays would appear to be obvious to the artisan without involving an inventive step (cf. Art. 33(1) and (3) and Rule 64 PCT).

Incorporation of the subject-matter of dependent claims 2-13 and 45, or 15-25 or 27-34 or 36 and 37 or 39-44 into anyone of the independent claims 1, 14, 26, 35 or 40 would not render these claims inventive, because the subject-matter of these dependent claims appears to be one of the straight forward possibilities from which the

**INTERNATIONAL PRELIMINARY  
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artisan would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

In summary, as presently formulated novelty and industrial applicability could apparently be recognized, but the inventivity of claims 1-45 can apparently not be recognized (cf. 33(1) and (3) and Rule 64 PCT).

**Re Item VI**

**Certain documents cited**

Depending on whether or not the present application validly claims a priority date earlier than the international filing date, the following document, which was cited in the international search report, might be considered in the course of further procedures.

H. Ge (15-1-2000). UPA, a universal protein array system for quantitative detection of protein-protein, protein-DNA, protein-RNA and protein-ligand interactions. Nucleic Acids Res, 28 (2), e3i - e3vii.

**Re Item VII**

**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 has not been mentioned in the description, nor has this document been identified therein.

**Re Item VIII**

**Certain observations on the international application**

1. Although claims 14, 23, 35, 38 and 40 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter. It would appear that conciseness and clarity ex art. 6 PCT could be enhanced by defining the relevant subject-matter in terms of a single independent claim, followed by dependent claims

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/US00/06244

covering features which are merely optional.

2. Claims 1, 2, 4, 21, 30 and 33 are not clear ex art. 6 PCT, because the term "substantially pure" is not clear; the artisan would not automatically understand which degree of purity is intended.

3. Claim 1 is not clear ex art. 6 PCT, because the term "addressable pattern" is not clear; the artisan would not automatically understand which pattern is intended.

4. Claim 6 is not clear ex art. 6 PCT, because the term "computer readable format" is not clear; the artisan would not automatically understand which format is intended.

5. Claim 10, 19, 28, 36 and 42 are not clear ex art. 6 PCT, because the term "microarray" is not clear; the artisan would not automatically understand which size is intended.

6. Claim 26 is not clear ex art. 6 PCT, because the term "instructions" is not clear in the context of said claim; the artisan would not automatically understand which technical features are intended. For completeness it is noted that "instructions" are not regarded as a characterizing technical feature of the kit of claim 26 of the PA. The applicant is required to indicate which features always and unambiguously distinguish his kit from those disclosed in the prior art.

7. The vague and imprecise statement in the description on page 32, last line, implies that the subject-matter for which protection is sought may perhaps be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, III-4.3a).

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>4239-54280</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/US 00/ 06244</b>	International filing date (day/month/year) <b>10/03/2000</b>	(Earliest) Priority Date (day/month/year) <b>10/03/1999</b>
Applicant  <b>THE GOVERNMENT OF THE UNITED STATES OF AMERICA...</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**UNIVERSAL PROTEIN ARRAY SYSTEM**

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.